Mediterranean Coast Network
FY2001 Budget and Projected FY2002 Budget for
Water Quality Monitoring

August 9, 2001

The Mediterranean Coast Network is composed of three parks: Santa Monica Mountains National Recreation Area (SAMO), Channel Islands National Park (CHIS), and Cabrillo National Monument (CABR). All three parks have characteristic Mediterranean-type climates of wet winters and warm, dry summers. The hydrologic systems are very flashy, with high runoff in the wet winter, and very low to intermittent flow dominating summer conditions. Although climatically similar, each park is unique in other ecological and managerial ways (Table 1). CHIS is an island system, unlike the two other parks. As a result, CHIS owns and/or manages large portions of its watersheds, providing the potential for greater long-term control of water quality in the park. SAMO is an extremely complicated system of national, state, and local parkland, amid numerous private holdings and development. Watersheds in SAMO contain well-protected areas as well as regions affected by numerous adjacent developments and non-point source pollutants. CABR is by far the smallest park in the network with relatively small watersheds characterized by intermittent flows during rainfall events.

Table 1. Summary of park units within the Mediterranean Coast Network.

Park Unit	Acronym	Date of Establishment	Size
Cabrillo National Monument	CABR	October 14, 1913	- 117 ha managed by NPS - 259 ha co-managed by NPS
Channel Islands National Park	CHIS	1938: Portions established as a National Monument 1980: Acreage increased; status changed to National Park	100,449 hectares
Santa Monica Mountains National Recreation Area	SAMO	November 10, 1978	- 8,753 ha managed by NPS - 20,742 ha managed by other park agencies - 31,255 ha in private ownership

The Mediterranean-type weather patterns for all three parks include short, mild, rainy (highly variable) winters and long dry, warm to hot summers. Average precipitation is 26 cm (10 inches) in San Diego, 37 cm (15 inches) in Los Angeles and 46 cm (18 inches) in Santa Barbara. Within the three National Park Service units, elevation ranges from 732 meters (2,400 feet) below sea level in park waters offshore of Santa Cruz Island, to 948 meters (3,111 feet) in Santa Monica Mountains with Cabrillo falling in between. Rainfall can also vary widely from year to year, depending on elevation, as well as global climatic factors, such as El Niño events. Extended periods of drought are also not uncommon.

As with other Mediterranean climate regions, southern California is favorable to human habitation and agriculture, as well as recreational activities. These human influences have dramatically affected the health of ecological systems, including water quality, water quantity, and hydrologic conditions. It is widely recognized across the network and among the many agencies in the region that monitoring and maintaining

water quality is critical to conservation efforts and human health. Thus, the development and implementation of a comprehensive water quality monitoring program within the network is a top priority.

Below is a brief synopsis of the freshwater resources and monitoring efforts for each of the network parks.

Santa Monica Mountains National Recreation Area

The Santa Monica Mountains National Recreation Area (SAMO) exists as a mosaic of different land ownerships and land uses extending over 60,750 ha (150,050 acres). Of that amount, 29,495 ha (72,850 acres) are currently in protected status through public ownership (8,753 ha, approximately 21,620 acres, are owned and managed by the NPS), with the remaining 31,255 ha (77,200 acres) in private ownership. Unlike most national parks, SAMO is still expanding as remaining open space parcels become available and are purchased as public parkland.

The aquatic resources of the Santa Monica Mountains are very diverse. Dozens of north-south canyons parallel each other throughout the mountains. Each of these has an intermittent or perennial stream, with associated riparian vegetation lining it. In addition, there are a large number of east-west trending drainages coming down the slopes of these canyons. Across the Santa Monica Mountains Zone (a region that extends beyond the recreation boundary to include watersheds within SAMO), there are a total of 828 stream segments, including 179 major streams with 49 coastal outlets.

The largest watershed within SAMO is the Malibu Creek watershed. It contains a total of 105 square miles and incorporates several major drainage basins (Medea Creek, Triunfo Creek, Cold Creek, Malibu Creek, Sleeper, Las Virgenes, and Potrero Valleys). Conversely, the smallest stream courses in the Santa Monica Mountains are the numerous isolated drainages. The group of small, isolated drainages comprises 17 percent of all streams in the Santa Monica Mountains Zone.

A wide variety of wildlife and localized plant communities can be found associated with the streams and aquatic resources of the Santa Monica Mountains. These include one of the southernmost runs of the endangered steelhead trout (*Oncorhynchus mykiss*) in the U.S., a diverse array of aquatic insects, and unique populations of big leaf maples (*Acer macrophyllum*), cottonwoods (*Populus* sp.) and alder (*alnus* sp.). The arroyo chub (*Gila orcutti*) is found in Malibu Creek and the endangered tidewater goby (*Eucyclogobius newberryi*) was recently reintroduced (1991) to Malibu Lagoon. In creeks that feed from the developed recreational/water supply lakes in the mountains, a variety of non-native fauna have been introduced, many significantly impacting sensitive native communities.

Runoff generated from developed areas has placed increasing pressure on the existing fresh water resources. Runoff from urban developments (e.g., roads, parking lots, residential and commercial areas) generally contributes more runoff, more quickly and with higher concentrations of pollutants than pre-development areas. The runoff from the developed areas could contain elevated levels of nutrients (such as phosphorous and nitrogen), pathogens, toxicants (e.g., heavy metals), and litter and trash loads. It is critical for the park to identify and monitor the consequences of these impacts on the condition and quality of water resources in the Santa Monica Mountains.

There are numerous ongoing water quality monitoring efforts in the mountains, but often they are being conducted independently and/or with very little coordination. For example, in the Malibu Creek watershed alone (Review of Monitoring and Response Protocol for the Malibu Creek Watershed, 1994) there are 42 surface water and sediment monitoring groups and over 70 ground water monitoring wells. Some samples are analyzed for a complete set of chemical constituents ranging from conventional pollutants to organic chemicals, pesticides, bacteria and viruses while others have a more limited scope. The quality of the data being collected may vary between the agencies. In addition, many other monitoring programs focus on a variety of environmental aspects, including water levels in Malibu Lagoon, brush and weed clearance compliance, and less formalized water quality. In general, water quality information, although collected in many areas of the mountains by many organizations, needs to be evaluated across the entire recreation area and evaluated to identify information gaps and opportunities for partnerships. This is one of the most

important tasks to pursue as the network initiates a water quality monitoring program among the three parks.

In part because of this variable approach and in part because of the need to evaluate all major watersheds in a more consistent way across the park, SAMO initiated stream surveys in the spring of 2000 across 31 major streams in the mountains. This effort was linked to the USGS-Biological Resources Division, Pepperdine University, the Resource Conservation District of the Santa Monica Mountains, the California State Park system, and other cooperating agencies and organizations. The goal of this program is to collect comparable baseline data on basic water quality parameters, stream habitat conditions, and invertebrate fauna. Also, a significant motivation for the work is to evaluate amphibian distributions across the mountains as well as the distribution of exotic species. Ultimately, it is expected that this work will become incorporated into the park's vital signs monitoring program for water quality and other ecosystem components. It is therefore critical to support this effort to ensure that adequate baseline data are collected during the transition into long-term monitoring.

Channel Islands National Park

Channel Islands National Park is part of an island chain lying just off California's southern coast. The five park islands and their surrounding one nautical mile of ocean comprise Channel Islands National Park. These islands and the adjacent submerged lands were set aside as a national park because of their outstanding and unique natural and cultural resources. Channel Islands National Park was designated an International Biosphere Reserve in recognition of its genetic diversity and importance as an environmental baseline for research and monitoring. In addition, Congress declared the waters surrounding the park islands out to six nautical miles as a National Marine Sanctuary.

Maintaining and/or improving water quality in both marine and freshwater ecosystems is an important objective of the Park. Though the islands lie 14 to 40 miles from the coast, the large population and industrial activities of the area have affects on the water quality. Relatively heavy boat traffic around the islands, natural seeps, boat groundings, or, rarely, major catastrophes such as the 1969 oil spill of Santa Barbara are sources of petroleum pollution. The extensive oil production facilities and tankering through the area pose a concern of future catastrophic oil spills. Other potentially serious water pollution sources include discharge from ships, sewage disposal or thermal pollution from nuclear plants, but none of these has been found to significantly impact island resources. Urban runoff brings debris, pesticides, nutrients, and potentially harmful bacteria to coastal waters that easily reach the islands during storms. Over a billion gallons of urban waste is discharged daily into the southern California Bight. Heavy metals and organochlorine pesticides still persist from past dumping in the ocean waters here. This resulted in reproductive failure of California brown pelicans, bald eagles, cormorants, and peregrine falcons, and caused problems with seals and sea lions. Banning of DDT in the United States in 1971 has resulted in substantial recovery of pelicans, cormorants, and peregrine falcons.

Freshwater water quality monitoring within Channel Islands National Park has focused on Santa Rosa Island. Santa Rosa Island has been the focus of water quality monitoring because of the degradation of valley bottoms and riparian areas as a result of livestock grazing. Santa Rosa Island is the second largest island within Channel Islands National Park (54,000 acres). Purchased in 1986 from the Vail and Vickers Company, the island supported domestic livestock grazing (sheep and cattle), and a managed herd of deer and elk. It is estimated that the most severe degradation of the stream bottoms occurred during the sheep era where between the years 1850-1900 as many as 125,000 sheep grazed the island at one time. However, water quality degradation continued throughout the 20th century as cattle replaced sheep grazing from 1902-1998. Cattle grazing on Santa Rosa Island degraded water quality to the point where the State of California (Central Coast Regional Water Quality Control Board) issued a Cleanup or Abatement Order (CAO) against the Park. Under this CAO the Park is required to do intensive water quality monitoring (bacti and inorganic) and reduce non-point water sediment from roads. Rescission of the CAO requires intensive monitoring to demonstrate improvement in water quality conditions following the post-grazing era. For Santa Rosa Island the major perturbation has been removed, but the Park has not been able to systematically document recovery of the island's freshwater ecosystems. It is within this context that the park would initially utilize the network's water quality funding.

Cabrillo National Monument

Cabrillo National Monument (CABR) is a small (160 acres of land area) urban national park site. CABR is located at the end of Point Loma (San Diego, CA), a long peninsula that is bordered by the Pacific to the west and San Diego Bay to the east. The oceanside of the peninsula coastline is mostly undeveloped, consisting of rocky intertidal habitat, with isolated sandy and cobble beaches. Most of the bayside of the peninsula shoreline is highly developed for various military and shipping activities. The jurisdiction of CABR includes approximately 120 acres of rocky intertidal and subtidal habitat. The rest of the coastline of the peninsula is owned by the U.S. Navy, the US Coast Guard or the City of San Diego (Point Loma Wastewater Treatment Plant). The small CABR tidepool area receives over 100,000 visitors every year, and is an important educational and recreational resource for the city of San Diego. Access to the rest of the shoreline on Point Loma is restricted.

Due to the geology of Point Loma, there are few freshwater resources in CABR. There are some freshwater seeps in the park which support a markedly different vegetation community than is found elsewhere in the park, including ferns and herbaceous plants. Very is little known about these communities, including the total number and specifics of their location, and given the lack of fresh water sources on the peninsula, they could have a critical role in the ecology of this arid ecosystem. A basic inventory and characterization of seeps at CABR and throughout the Point Loma Ecological Reserve would be an important first step toward filling this information gap.

Over 300 species of marine algae and invertebrates have been documented in the CABR tidepools, including unusually large owl limpets (*Lottia gigantea*) and abundant juvenile spiny lobsters (*Panulirus interruptus*). A number of fish, such as opaleye (*Girella nigricans*) and garibaldi (*Hypsypops rubicundus*) use the tidepools as a nursery ground. Various shorebirds and seabirds use the CABR intertidal as a foraging ground. Great blue herons (*Ardea herodias*), which are protected under the federal Migratory Bird Treat Act, actively nest on Point Loma. They are often seen feeding in the CABR tidepools. Occasionally, seals or sea lions will haul out within CABR jurisdiction.

NPS has been conducting ecological monitoring in the CABR tidepools since 1990. After the first five years of monitoring, it was determined that seven out of the thirteen invertebrate and plant species that were being monitored had either declined or disappeared entirely from the area. Abalone, mussels, and boa kelp populations were of particular concern. Ochre seastars (*Pisaster ochraceus*), commonly found throughout the rest of San Diego County, have essentially disappeared from Point Loma. As a result of this study, one third of the CABR intertidal was closed to all visitors, a small no-use reserve commonly referred to as "Zone III". The purpose of this restriction is to allow the area to recover.

The causes of these declines are unknown. Some of the anthropogenic threats to tidepools include the effects of heavy visitation, sand inundation from upcurrent beach replenishment, climate change, and pollution. The effects of poor water quality are potentially quite serious in Point Loma. San Diego Bay is a very active harbor with various shipping, industrial, and military activities. It is the second-most toxic harbor in the nation, according to a 1998 study by NOAA and the California State Water Resources Control Board. CABR is located at the mouth of the bay and is bathed in bay water during daily tidal flushing. Marine organisms within CABR are likely exposed to heavy metals, persistent organic compounds and hydrocarbons originating in the bay. Zone III, the no-use area, is located at the southern tip of Point Loma and is most exposed to bay water. California mussel (*Mytilus californianus*) populations, which have declined from approximately 30% to close to 0% cover in the past ten years, have been hardest hit in the no-use area. The source of this decline is unknown, but this pattern indicates that pollution is a potential cause.

Although San Diego Bay is likely to be the most significant source of pollutants to CABR, additional sources include local surface runoff, sewage, and Mission Bay, to the north of Point Loma. The Point Loma Wastewater Treatment Plant is adjacent to CABR boundaries, although the discharge pipe is located 7 km offshore in approximately 100 m of water and is unlikely to directly affect the area. In 1992, a large sewage spill caused the closure of the CABR tidepools. No direct effects of this spill were detected.

Although San Diego Bay is monitored for water pollution, the water quality of Point Loma is relatively unknown. Beginning in 1986, the NOAA Mussel Watch Program used the soft tissues of mussels and other bivalves to monitor pollution all over the United States. One of their sites was the Point Loma Lighthouse (i.e. Cabrillo National Monument). This site was listed, along with 20 other sites nationwide, for having "high and increasing concentrations" of mercury and nickel in 1993. Mussel Watch stopped using the Point Loma Lighthouse site, since the mussel populations had crashed and taking samples was no longer possible. Currently, little is known about the heavy metal exposure of the habitat within CABR boundaries. The City of San Diego monitors bacterial counts in Zone III.

Work Plan

The water quality work plan for the Mediterranean Coast Network reflects the conditions and issues described above for each of the network parks. In particular, the work plan addressed three main objectives, consistent with the needs of the parks and network:

1. Collect, compile, and evaluate known information about fresh, estuarine, and marine water resources and water quality monitoring among the network parks.
2. Support and/or complete ongoing baseline water quality data collection in the network parks, specifically at SAMO and CHIS.
3. Develop a long-term strategy to implement appropriate water quality monitoring programs, including consideration of existing efforts from cooperating agencies across the network and the provision of NPS staff and resources to coordinate and manage such a strategy.

The first two objectives are the focus of funds from the FY 2001 water quality monitoring budget. It is anticipated that all three objectives will be pursued with FY 2002 funding. To meet the three objectives over the next two years, the network proposes to build baseline data in CHIS and SAMO, evaluate existing data and information needs across the network by hiring a water quality expert, conduct a network-wide workshop to identify long-term monitoring priorities and implementation strategies for freshwater, estuarine, and marine systems, and recruit and hire network water quality monitoring coordinator to synthesize all of this information and develop a final long-term water quality monitoring strategy. In future fiscal years, the network water quality monitoring coordinator will be responsible for implementing the strategy. Detailed budget breakdowns and justifications for specific funding requests are provided below for FY 2001 and FY 2002.

Fiscal Year 2001

The most important task to be accomplished for the network is the collection, compilation, and evaluation of existing water quality data and monitoring efforts among the three parks, including monitoring being conducted by other agencies. This task will be completed by a water quality expert hired through the Resource Conservation District of the Santa Monica Mountains (RCD) through an existing cooperative agreement. The individual hired will be responsible for both freshwater and marine water quality monitoring issues. The detailed tasks and deliverables for this position will be developed in a project statement in cooperation with the RCD. We anticipate that an individual will be identified and hired by September 2001 and continue to work on the project for next six months. Total cost for this work is budgeted at $27,600 (see budget table, below).

Because an important task for this individual will be to evaluate the information and water quality monitoring needs (if any) at Cabrillo National Monument, a travel budget of $1,600 is also requested for the RCD employee. Supplies and equipment costs, such as copying and purchasing data, acquiring miscellaneous materials for report preparation, etc. is estimated at $2,000.

In SAMO, a critically important piece of information that must be included as part of the baseline water quality information for the park is analysis of invertebrate samples collected as part of the park's stream survey program. The most efficient and effective way to complete this work is to send the 70 samples already collected to a professional lab for analysis. The total cost for this service will be $14,000.

To ensure that SAMO can collect another year of stream survey data and to collect these data in a way consistent with the other agencies cooperating in this effort, $6,500 is requested to cover equipment and supply purchases. Specifically, the funds are needed to acquire water quality monitoring equipment to ensure interagency consistency and to obtain necessary monitoring supplies. The details of these needs are indicated in the budget table below.

Channel Islands would continue to monitor vegetation and stream morphology change on Santa Rosa Island, including: 1) conducting Level II characterization of the Old Ranch Watershed (Rosgen Channel Classification); 2) monitoring fifty-six nested-rooted frequency and cover riparian transects established in the Quemada Stream drainage; 3) re-surveying nine precise cross-section profiles in the Old Ranch stream to measure changes in channel morphology; and 4) establishing a 1,000 meter stream condition assessment transect (using R5 Forest Service Stream Condition Assessment Protocol) in Arlington Stream.

This information would be summarized in a report that will be given to the Central Coast Regional Water Quality Control Board as part of the Park's effort to rescind the Cleanup or Abatement Order. Road improvements such as the Smith Highway would also be documented and presented as part of the rescission package.

In anticipation of the arrival of the water quality monitoring coordinator for the network in FY 2002, a computer will be purchased during FY 2001. In addition to the hardware for a GIS-compatible machine, necessary software will also be procured. Total cost is estimated at $4,300.

FY 2001 Budget Table

Item	Description	Cost
Water Quality Expert hired by RCD via Cooperative Agreement	The Water Quality Expert will be responsible for collecting, compiling, and evaluating water quality data from all network parks. These data will be used to identify monitoring gaps and data needs for a future long-term monitoring strategy for the network. Fulltime RCD employee for 6 months @ $25 per hour plus 15% overhead to RCD (per existing cooperative agreement).	**27,600**
Travel Expenses	Travel expenses for RCD Water Quality Expert to visit CABR, collect necessary data, interview staff and experts, etc. (Two trips, one week each, $800 per trip.)	**1,600**
Supplies for RCD	Miscellaneous supplies for RCD Water Quality Expert.	**2,000**
Laboratory Analysis of SAMO Invertebrates	Analysis of 70 samples @ $200 per sample.	**14,000**
Equipment for SAMO Invertebrate Monitoring	Stereo Zoom Macroscope with fiber optic light.	**1,430**
SAMO Water Quality Monitoring Equipment	LaMotte 2020 turbidity meter @ $769.00; Oakton conductivity meter @ $498.00; LaMotte SMART colorimeter (for organic nutrient loads) @ $969.00;	**2,236**
SAMO Water Quality Monitoring Supplies	Replacement kits for existing water quality instruments, vials, and storage units for the maintenance of aquatic invertebrate collections, and other miscellaneous equipment and supplies.	**2,834**
CHIS Water Quality Monitoring Personnel Expenses	GS-05/07 Technician to collect water quality data at CHIS.	**17,000**
CHIS Travel Expenses for Island Visits	Per Diem – 15 island tours at $15 per day.	**1,500**

CHIS Laboratory Analysis of Water Samples	Supplies and expenses for three water quality Bacti and TDN monitoring trips at $400 per trip; $300 for supplies.	**1,500**
Computer for NPS Water Quality Monitor.	A GIS-capable computer, including applicable software, is needed for the network Water Quality Monitoring Coordinator to be hired in FY 2002.	**4,300**
	TOTAL FOR FY 2001	**76,000**

Fiscal Year 2002 (anticipated)

A critically important step in developing a water quality monitoring strategy for the network will be to obtain input and information from staff at the three parks and from the numerous agencies and experts that already work within the network. This will be accomplished through a network-wide water quality monitoring workshop to be held in the spring or summer of 2002. The workshop will be linked the network's overall vital signs monitoring program and will likely be a subset or smaller specialized group meeting within an overall vital signs coordination meeting planned for 2002. Support to conduct the workshop is estimated at $9,000, including various materials and supplies, refreshments, facility rental, and some travel expenses for selected critical participants.

Midway through FY 2002, the network will hire a water quality monitoring coordinator to synthesize data collected by the RCD employee, coordinate efforts on the workshop, oversee the completion of baseline data collection in SAMO and CHIS, and develop a network-wide water quality monitoring strategy. It is anticipated that the coordinator will be classified as an aquatic ecologist or hydrologist, depending on the specific duties that are identified over the next few months. The individual hired will have to be conversant in both freshwater and marine systems, since all three parks have both systems. The full performance level for this professional position will be GS-11. The FY 2002 cost estimate for the monitoring coordinator is estimated to be $35,000 for 7 months, including 30% benefits. This position will be located at SAMO, consistent with the park's geographically central location and to ensure close coordination with the network vital signs monitoring coordinator, also based at SAMO.

In addition to the salary and benefit costs for the coordinator, a travel, training, and supplies and equipment budget of $5,000 is requested. It is expected that the coordinator will need to travel within the network and to NPS-related monitoring training and meetings.

To complete baseline data collection for the stream surveys in SAMO, five months of salary support for a GS-07 technician is requested. This individual will be responsible for the spring 2002 stream survey data collection, processing, and analysis, in cooperation with other researchers and SAMO staff. Cost for this position is estimated at $17,000, including benefits.

Funds for CHIS will be used to expand water quality monitoring to marine ecosystems, including conducting baseline inventories on estuaries which have yet to be described or have been minimally described on Santa Rosa and Santa Cruz Islands. Laboratory analysis of marine water quality samples will also be completed in an effort to demonstrate the importance of conservation efforts within the park and Channel Islands National Marine Sanctuary.

FY2002 Budget Table (preliminary)

Item	Description	Cost
Network Water Quality Monitoring Coordinator.	GS 07/09/11 Aquatic Ecologist/Hydrologist (to be determined) w/COLA and 30% benefits for 6 months.	**35,000**
Travel, Training, and Supplies	Travel and training for the monitoring coordinator, including travel within the network and travel to NPS regional meetings; miscellaneous operational supplies for water quality	**5,000**

	monitoring.	
Workshop Expenditures	Support for water quality monitoring workshop, including facility rental, supplies and materials, and some travel for selected participants.	**9,000**
SAMO Water Quality Monitoring Technician	GS-07 Biological Science Technician w/COLA and 30% benefits for five months to continue baseline data collection on stream water quality in SAMO.	**17,000**
CHIS Water Quality Monitoring Technician	Estuaries on Santa Cruz Island and Santa Rosa Island have not had basic surveys to describe attributes. A GS-07 Biological Technician will provide assistance to complete this baseline work.	**8,000**
CHIS Water Quality Laboratory Analysis	Baseline marine/estuarine water quality samples collected by the technician will be processed/analyzed through contract to a laboratory.	**2,000**
	TOTAL FOR FY 2002	**76,000**